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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/705,274	11/03/2000	Misbahul Azam	ONS00114	4443

7590 02/14/2002
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EXAMINER

BRAIRTON, SCOTT A

ART UNIT	PAPER NUMBER
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2823

DATE MAILED: 02/14/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/705,274

Applicant(s)

AZAM ET AL.

Examiner

Scott A Brairton

Art Unit

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 June 2001.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-27 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01 June 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

Claims 1-26 are rejected under 35 U.S.C. 102(a) as being anticipated by Madson (US2001/0049167 A1).

Madson discloses in figures 1-12 and related text a method of forming a trench in a semiconductor device, comprising:

providing a substrate (figure 8A, 800) for the semiconductor device;

forming a first epitaxial layer (figure 8A, 802) on the substrate;

disposing a masking material (figure 8A, 804) on the substrate and first epitaxial layer, wherein the masking layer is from a group consisting of silicon dioxide and silicon nitride (paragraph [0055]);

forming a mask (paragraph [0056]) at the location of the trench after disposing the masking material;

forming a protruding portion (figure 8B, 806) at a location of the trench by forming an opening in the masking material adjacent to the location of the trench, wherein forming the protruding portion further includes performing an etch step to remove the masking material where the mask is absent to form the opening (paragraph [0056]);

depositing an epitaxial material comprising silicon to fill in the openings (figure 8C, 808), wherein depositing the epitaxial material includes using a selective epitaxial growth process to fill the openings (paragraph [0057]);

removing the protruding portion to form the trench (figure 8D, 810) within the second epitaxial layer aligned with the major surface of the first epitaxial layer of the semiconductor device (paragraph [0058]);

depositing a gate structure (figure 10H, 28) within the trench to form the semiconductor device.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Madson in combination with Williams et al. (US Patent No. 6,239,463).

Madson discloses all the limitations of claims 1-26 as described above, but fails to disclose depositing the epitaxial material using a blanket epitaxial growth process to fill the openings and a source region formed within the epitaxial layer and a p-type region adjacent to the source region in the epitaxial region.

Examiner takes official notice that the use of blanket epitaxial growth was well known at the time of the invention and that it would have been obvious to one skilled in the art to use a blanket epitaxial growth process to deposit the semiconductor material over the protruding

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region and in the openings. Further, Madson discloses that an alternative to selective epitaxial growth is to use non-selective epitaxial deposition and then pattern and etch (paragraph [0049]) to produce the same results as is achieved by using a selective epitaxial growth process. It would have been obvious to one skilled in the art at the time of the invention to combine the well-known process of non-selective epitaxial growth (i.e., blanket epitaxial growth) with the method of Madson to achieve the claimed invention.

Williams et al. discloses in figure 1 and related text a p-type region 14 adjacent to source region 15 in the epitaxial layer 12.

It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the teachings of Williams et al. with Madson in order to reduce the resistance and therefore improve the resistance (col. 1, lines 5-40).

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

US Patent No. 6,150,708 to Gardner et al.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Scott A Brairton whose telephone number is (703) 605-4213. The examiner can normally be reached on M-F, 8:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (703) 308-4918. The fax phone numbers for the

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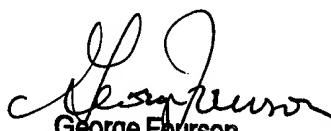
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organization where this application or proceeding is assigned are (703) 746-4082 for regular communications and (703) 746-4082 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Scott A Brairton
Examiner
Art Unit 2823

sab
February 7, 2002


George Fourson
Primary Examiner
2823